

Application No. 10/708,020
Technology Center 1775
Amendment dated April 26, 2007
Reply to Office Action dated February 5, 2007

REMARKS

As of the filing of the present Office Action, claims 1-12 and 14-20 were pending in the above-identified US Patent Application. In the Office Action, the Examiner rejected claim 11 under 35 USC §112, second paragraph, and rejected all of the pending claims under 35 USC §103 on the basis of the following prior art combinations:

(1) U.S. Patent No. 6,887,595 to Darolia et al. (Darolia) in view of U.S. Patent No. 4,377,371 to Wisander et al. (Wisander);

(2) Darolia in view of U.S. Patent No. 5,073,433 to Taylor (Taylor '433) in further view of U.S. Patent No. 5,520,516 to Taylor (Taylor '516);

(3) U.S. Patent No. 6,764,779 to Liu et al. (Liu) in view of Wisander; and

(4) Liu in view of Taylor '433 and in further view of Taylor '516.

In response, Applicants have amended the claims as set forth above. More particularly:

Independent claim 1 has been amended to recite that the thermal barrier coating system (14) is on a surface of a component (10), and independent claim 17 has been amended to make consistent use of "component" instead of "substrate."

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Independent claims 1 and 17 have been further amended to recite that the thermal barrier coating system (14) comprises a "multilayer thermal barrier coating consisting of" the first and second ceramic layers (20,22) (and, in claim 1, optionally one or more intermediate layers), and that the second ceramic layer (22) defines the outermost surface of the component (10). In claim 1, the optional intermediate layer(s) is required to provide a compositional gradient between the first and second ceramic layers (20,22) whereby the concentrations of partially and fully-stabilized zirconia decrease and increase, respectively, in the direction toward the second ceramic layer (22), and in the absence of the intermediate layer(s) the second ceramic layer (22) overlies and contacts the first ceramic layer (20). Support for these amendments can be found in paragraphs [0008] and [0014] (multilayer thermal barrier coating), paragraph [0016] (intermediate layers), and Figure 1.¹

Dependent claim 9 has been amended to recite ranges for the

¹ According to MPEP §2163 II.A.3(a), "drawings alone may provide a 'written description' of an invention as required by [35 USC §112, first paragraph]," and "[i]n those instances where a visual representation can flesh out words, drawings may be used in the same manner and with the same limitations as the specification." (Citations omitted).

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thicknesses of the first and second ceramic layers (20,22) that find support in paragraph [0018] of Applicants' specification.

Finally, dependent claim 14 has been amended in view of the amendments to its parent claim 1.

Applicants believe that the above amendments do not present new matter. Favorable reconsideration and allowance of claims 1-12 and 14-20 are respectfully requested in view of the above amendments and the following remarks.

Rejection under 35 USC §112, Second Paragraph

Claim 11 was rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as their invention. The Examiner's concern was that the limitation in claim 11 conflicted with its parent claim 9. Applicants believe that the above-noted amendment of claim 9 provides consistency with claim 11, and therefore respectfully request withdrawal of the rejection under 35 USC §112, second paragraph.

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Rejections under 35 USC §103 based on Darolia

As noted above, Darolia was applied to the claims in combination with Wisander and in combination with Taylor '433 and Taylor '516. Darolia was filed prior to, but issued after, the filing of the present application, and therefore qualifies as prior art only under §102(e). §103 rejections based on a §102(e) reference can be overcome by a showing that the subject matter of the application and the reference were, at the time the invention was made, commonly-owned or subject to an obligation of assignment to the same entity, if the application was pending on or after December 10, 2004 (see MPEP 706.02(I)).

The undersigned hereby affirms that, at the time Applicants' invention was made, the inventors identified in the present application and in Darolia were employed by and subject to an obligation of assignment to the same entity, namely, the General Electric Company, as evidenced by the recorded Assignments to General Electric Company for both patent applications.

In view of the above, Applicants respectfully request withdrawal of the rejections under 35 USC §103 based on Darolia.

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Rejections under 35 USC §103 based on Liu

Liu teaches a multilayer thermal barrier coating made up of alternating layers of partially-stabilized and fully-stabilized zirconia. Lui teaches that the purpose of using layers of different zirconia materials is to decrease thermal conductivity (column 1, lines 45-50), that multiple layers of each zirconia material are desired (column 2, lines 37-39), and that thermal conductivity decreases with the use of more alternating layers of the different zirconia materials (column 6, lines 23-34). As such, it would be completely contrary to Liu for one to reduce the number of partially-stabilized and fully-stabilized zirconia layers in Liu's multilayer thermal barrier coating to one each, as now required by Applicants' independent claims 1 and 17 (through use of the transition "consisting of" to define the elements of Applicants' claimed "multilayer thermal barrier coating"). Any proposed modification of Liu based on the teachings of Wisander, Taylor '433 and/or Taylor '516 would still require Liu's multiple layers of partially and fully-stabilized zirconia, contrary to Applicants' claims. For this reason, Applicants believe that the rejections based on Liu are overcome.

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Applicants also respectfully believe that their claimed coating system is distinguishable from Liu, in that Lui teaches that the partially-stabilized zirconia layer defines the outermost layer of Liu's multilayer thermal barrier coating in order to achieve "good erosion resistance on the top surface" (column 2, lines 35-36). In response to this argument, which was presented by Applicants in their Submission filed December 5, 2006, the Examiner replied that the claims did not distinguish from Liu in this regard because of the use of the term "comprising" in the claims. However, use of the term "comprising" in the preamble of the claims is irrelevant, because Applicants claims unequivocally require that a fully-stabilized zirconia layer defines the outermost layer of Applicants' claimed coating system, which excludes the presence of any other layer as the outermost layer of Applicants' claimed coating system, and therefore precludes Applicants' claims from reading on Liu's coating system in which a partially-stabilized zirconia layer defines the outermost layer of a coating system.

Finally, Applicants respectfully believe that the second layer (22) of their claimed coating system (14) is distinguishable from Wisander, in that Wisander's crack-containing layer is disclosed as being a "fused" and "dense"

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layer (column 2, lines 56-62). In response to this argument in their Submission, the Examiner replied that the claims did not distinguish from Wisander in this regard because

Wisander was used in the rejection to show the obviousness of the presence of microcracks in preventing thermal shock and improving erosion resistance. The reference was not used to identify as obvious the method of production of the microcracks. . . . Wisander teaches microcracks formed in a plasma sprayed surface (column 2, line 55) and thus a layer having the claimed characteristics. The fused layer only forms where the laser is used to create microcracks (column 2, lines 56-57) and thus will not result in fusing of the entire layer.

In making such a statement, the Examiner fails to recognize that Wisander's microcracks are present only where the coating surface has been treated, such that microcracks are present only where the coating is "fused" and "dense." Wisander teaches a coating and coating structure that differs from Applicants' claimed coating and coating structure because the only crack-containing coating disclosed by Wisander is "fused" and "dense," contrary to Applicants' claimed coating and coating structure. As such, the Examiner's reliance on Wisander to modify Liu and arrive at Applicants' claimed invention

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also requires the modification of Wisander's teachings by eliminating two disclosed features of Wisander's crack-containing layer - "fused" and "dense."

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.

In re Fritch, 23 USPQ2d 1780, 1783-1784 (Fed. Cir. 1992).

Therefore, if the Examiner is to continue relying on Wisander, the Examiner must explain what motivation there is to eliminate the "fused" and "dense" characteristics of Wisander's cracking-containing layer.

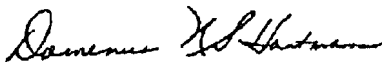
In any event, because any proposed modification of Liu based on the teachings of Wisander, Taylor '433 and/or Taylor '516 would still require Liu's multiple layers of partially and fully-stabilized zirconia, Applicants believe that the rejections based on Liu are overcome and therefore respectfully request their withdrawal.

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Closing

Should the Examiner have any questions with respect to any matter now of record, Applicants' representative may be reached at (219) 462-4999.

Respectfully submitted,

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